LUIS MATEUS ROCHA

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Recent Professional Appointments:

LOS ALAMOS NATIONAL LABORATORY, MODELING, ALGORITHMS, AND INFORMATICS GROUP, Technical Staff since 01/99, Postdoctoral Associate, 1997-1999. Leader of the *Complex Systems Modeling Research Focus Area*.

INSTITUTO GULBENKIAN DA CIENCIA, Portugal. Director of the *Mathematical and Computational Biology Collaboratorium*, member of the Steering Committee of the PhD Program in Computational Biology 04/00-present.

UNIVERSITY OF CALIFORNIA, LOS ANGELES, INSTITUTE FOR PURE AND APPLIED MATHEMATICS *Fellowship appointment, March-June 2004,* Program on "Proteomics: Sequence, Structure, Function"

STATE UNIVERSITY OF NEW YORK AT BINGHAMTON, DEPARTMENT OF SYSTEMS SCIENCE AND INDUSTRIAL ENGINEERING, Adjunct Professor, 1995-1997 and Information Systems Manager, 1995-1997

Research Interests:

Complex Systems Modeling: Network Analysis (Biological, Social and Knowledge Networks), Agent-based Modeling, Collective Knowledge Organization, Dynamical Systems.

Computational and Mathematical Biology: Bioinformatics, Microarray Data Analysis, Automatic Functional Annotation, RNA Editing, Network Models, Systems Biology, Evolutionary Systems, Origin of Codes.

Distributed Artificial Intelligence and Artificial Life: Adaptive and Evolutionary Computation, Cellular Automata, Emergent Computation, Embodied Cognition, Cognitive Categorization, Origin of Symbols.

Informatics: Intelligent Information Retrieval, Recommendation Systems, Knowledge Management, Data-Mining, Knowledge Discovery, Bioinformatics, Internet Development.

Uncertainty Modeling: Fuzzy Set Theory, Evidence Theory, Measures of Uncertainty, Interval Computation, Evidence Sets, Fuzzy Graphs, Decision-Support Systems.

Academic Education:

PhD in Systems Science, 1997, State University of New York, Binghamton, New York.

Bachelor's in Mechanical Engineering (1985-1988) and Masters in Systems Engineering (1988-1990), Instituto Superior Técnico, Lisbon, Portugal.

Professional Service:

Editorial Board: *Journal of Applied Systems Studies*

Ad Hoc Editor: *Artificial Life, Biosystems, Communication and Cognition - Artificial Intelligence*

Ad Hoc Reviewer: *Adaptive Behavior, Advances in Complex Systems, Artificial Life, Behavioral and Brain Sciences, Biosystems, Clinical Chemistry, Complex Systems, IEEE Trans. on Evolutionary Computation, IEEE Trans. on Systems Man and Cybernetics, Int. Journal of Human-Computer Studies, International Journal of General Systems, International Journal of Operations Research, Journal of Artificial Societies and Social Simulation, Proceedings of the National Academy of Sciences* (PNAS), *Systems Research.*

Selected Conference Program Committees and Organization

Agent-Based Simulation 5, Lisbon, Portugal May 3-5, 2004
Genetic Regulatory Networks: Theory and Practice (workshop) Canberra, Australia, December 2003
2003 Congress on Evolutionary Computation (CEC), Canberra, Australia, December 2003
IEEE Integration of Knowledge Intensive Multi-Agent Systems, Cambridge, MA., 1-3 October 2003.
Oeiras Mathematical and Computational Biology Workshop, Oeiras, Portugal, June 20th 2003.
International seminar on new robotics, evolution and embodied cognition, Lisbon, November 12-15 2002.
From Intelligent Networks to the Global Brain: Evolutionary Social Organization through Knowledge Technology, Brussels, July 3-5, 2001.
Congress on Evolutionary Computation (CEC) part of the IEEE World Congress on Computational Intelligence, Hawaii, 2002.
Complex Systems 2000, Dunedin, New Zealand, November 2000.

Review Panels

UMCEES Review Panel, National Research Council, 2001

Information Technology and Robotics Review Panel of the Fundacao Ciencia e Tecnologia, Portugal 2000, 2003

Computer Science and Software Engineering internal proposal (LDRD) review committee at the Los Alamos National Laboratory 1998-2000.

Selected Recent Invited Lectures

INFORMATION SCIENCE AND TECHNOLOGY COLLOQUIUM, NASA GODDARD SPACE FLIGHT CENTER, Jan. 29, 2003
Featured speaker

CENTER FOR THE STUDY OF COMPLEX SYSTEMS, UNIVERSITY OF MICHIGAN, ANN ARBOR, December 5, 2002
Invited Speaker

CRITICAL STUDIES WORKSHOP, STANFORD UNIVERSITY, MAY 8, 2002.
Invited speaker.

GORDON RESEARCH CONFERENCE ON RNA EDITING JANUARY 21-26, 2001, VENTURA, CA.
Invited keynote session speaker: "Simulations of RNA Editing and the Origin of Codes".

HETERARCHIES: DISTRIBUTED INTELLIGENCE AND THE ORGANIZATION OF DIVERSITY, SANTA FE INSTITUTE WORKSHOP OCTOBER 13 AND 14, 2000, SANTA FE, NM.
Invited Speaker

SANTA FE INSTITUTE WORKSHOP DESIGN PRINCIPLES FOR THE IMMUNE SYSTEM AND OTHER DISTRIBUTED AUTONOMOUS SYSTEMS, JULY 11-16, 1999, SANTA FE, NM.
Invited Speaker: "Biologically Motivated Distributed Designs for Adaptive Knowledge Management".

Selected List of Recent Publications:

Challacombe, J,, A. Rechtsteiner, L.M. Rocha, E.P. Brown, T. Shenk, M. Altherr, T. Brettin [2004]. "Evaluation of the host transcriptional response to human cytomegalovirus infection". *Physiological Genomics*. *Submitted.*

Huang, Chien-Feng and Luis M. Rocha [2003]. "Exploration of RNA Editing and Design of Robust Genetic Algorithms". *2003 IEEE Congress on Evolutionary Computation (CEC),* Canberra. IEEE Press, pp. 2799-2806.

Joslyn, Cliff and Luis M. Rocha [1998] "Towards a Formal Taxonomy of Hybrid Uncertainty Representations". *Information Sciences*. Vol. 110, pp. 255-277.

Rocha, Luis M. And W. Hordijk [2004]. "Material Representations: From the Genetic Code to the Evolution of Cellular Automata". *Artificial Life*. In Press.

Rocha, Luis M. and Johan Bollen [2001]. Biologically motivated distributed designs for adaptive knowledge management". In: *Design Principles for the Immune System and other Distributed Autonomous Systems*. L. Segel and I. Cohen (Eds.) . Oxford University Press, pp. 305-334.

Rocha, Luis M. (Ed.)[2001]. *The Physics and Evolution of Symbols and Codes. Biosystems* Vol. 60, No. 1-3. Editorial: *Biosystems* Vol. 60, pp. 1-4.

Rocha, Luis M. [2001]. "Evolution with material symbol systems". *Biosystems*. Vol. 60, pp. 95-121.

Rocha, Luis M. [2002]. "Semi-metric Behavior in Document Networks and its Application to Recommendation Systems". In: *Soft Computing Agents: A New Perspective for Dynamic Information Systems*. V. Loia (Ed.) International Series Frontiers in Artificial Intelligence and Applications. IOS Press, pp. 137-163.

Rocha, Luis M. [2000]. "Syntactic autonomy, cellular automata, and RNA editing: or why self-organization needs symbols to evolve and how it might evolve them". *Annals of the N. Y. Academy of Sciences.* Vol. 901, pp 207-223.

Rocha, Luis M. [1999]."Evidence Sets: Modeling Subjective Categories." *International Journal of General Systems*. Vol. 27, pp. 457-494.

Rocha, Luis M. [1996]. "Eigenbehavior and symbols." *Systems Research* Vol. 13, No 3, pp. 371-384.

Rocha, Luis M. [1995]."Contextual Genetic Algorithms: Evolving Developmental Rules." In: *Advances in Artificial Life*. F. Moran, A. Moreno, J.J. Merelo, and P. Chacon (Eds.). Lecture Notes in Artificial Intelligence, Springer-Verlag. pp. 368-382.

Wall, Michael E., Andreas Rechtesteiner, and Luis M. Rocha [2003]. "Singular Value Decomposition and Principal Component Analysis ". In: *Understanding And Using Microarray Analysis Techniques: A Practical Guide*. D. P. Berrar, W. Dubitzky, and M. Granzow (Eds.). Kluwer Academic Publishers, pp. 91-109.